MAGNETIC RESONANCE IMAGING VERSUS MUSCULOSKELETAL ULTRASOUND – A COMPARISON OF TWO IMAGING MODALITIES FOR IDENTIFICATION AND LOCALIZATION OF PLANTAR PLATE PATHOLOGY

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My disclosure is in the Final AOFAS Program Book.
I have no potential conflicts with this presentation.
INTRODUCTION

- MRI has been shown to have an accuracy as high as 95% for imaging tears of the plantar plate\(^1,3\).
- Musculoskeletal ultrasound has been shown to have varying degrees of accuracy for the imaging of tears of the plantar plate.
- There has not been a study comparing the accuracy of these two modalities on the same patients where intra-operative examination was utilized as the gold standard of reference.
- Therefore, the purpose of this study is to:
  - Directly compare the accuracy of these two modalities in the same patient population using intra-operative examination as the gold standard of reference.
Methods

- 50 consecutive patients with unilateral forefoot pain were included in this study.

- **MSK US Protocol**
  - Longitudinal images were reviewed and graded as ‘torn’ or ‘intact.’
  - Transverse images were utilized to localize the suspected pathology.
  - A Foot & Ankle Surgical Fellow performed and graded all exams.

- **MRI Protocol**
  - MRI was performed in sagittal, long axis and short axis planes.
  - Metatarsal planar reconstruction images were also obtained.
  - A Fellowship Trained Musculoskeletal Radiologist read all images.

- The physicians reading the MSK US and the MRI were blinded to each other’s results.
RESULTS — IDENTIFICATION

- Longitudinal MSK US correctly identified 41 (91.1%) plantar plate tears.
- MRI correctly identified 35 (76.0%) plantar plate tears.

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<tr>
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<th>Intra-op Ruptured</th>
<th>Intra-op Intact</th>
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<tbody>
<tr>
<td>MSK US – Ruptured</td>
<td>41</td>
<td>4</td>
</tr>
<tr>
<td>MSK US – Intact</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>MRI – Ruptured</td>
<td>35</td>
<td>5</td>
</tr>
<tr>
<td>MRI – Intact</td>
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RESULTS — LOCALIZATION

- Transverse ultrasound correctly localized 19 (38.0%) plantar plate tears.
- LCL injuries were not identified on ultrasound.

- MRI correctly localized 23 (51.1%) plantar plate tears.
- MRI correctly identified 4 LCL injuries — one of which was isolated.

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<th>Intra-op Ruptured</th>
<th>Intra-op Intact</th>
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<tbody>
<tr>
<td>MSK US – Correctly Localized</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>MSK US – Incorrectly localized</td>
<td>26</td>
<td>3</td>
</tr>
<tr>
<td>MRI – Correctly Localized</td>
<td>23</td>
<td>4</td>
</tr>
<tr>
<td>MRI – Incorrectly localized</td>
<td>22</td>
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DISCUSSION

- MRI and MSK US were both able to detect the presence of plantar plate pathology in >75% of patients.

- MRI was much better at localizing pathology than MSK US.

- MRI was able to detect LCL injuries – whereas MSK US was not.
CONCLUSION

- Both MRI and MSK US are appropriate soft tissue imaging modalities for the plantar plate when the anatomy is understood by the technician and the radiologist.

- MSK US should not replace MRI in all cases as this is a highly technician dependant imaging modality with a steep learning curve.
REFERENCES

